



Calhoun: The NPS Institutional Archive

Theses and Dissertations

Thesis Collection

2007-06

Evaluating Russian dual-use nuclear exports

Bitterman, Blaine S.

Monterey, California. Naval Postgraduate School

<http://hdl.handle.net/10945/3504>



Calhoun is a project of the Dudley Knox Library at NPS, furthering the precepts and goals of open government and government transparency. All information contained herein has been approved for release by the NPS Public Affairs Officer.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

<http://www.nps.edu/library>



**NAVAL
POSTGRADUATE
SCHOOL**

MONTEREY, CALIFORNIA

THESIS

EVALUATING RUSSIAN DUAL-USE NUCLEAR EXPORTS

by

Blaine S. Bitterman

June 2007

Thesis Co-Advisors:

Peter Lavoy
Anne Clunan

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE June 2007	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE: Evaluating Russian Dual-Use Nuclear Exports			5. FUNDING NUMBERS	
6. AUTHOR Blaine S. Bitterman				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (maximum 200 words) Non-proliferation is a major concern of the international community, the United States, and Russia. This thesis examines Russia's role in the non-proliferation regime through 2004. Russia has continually said it is committed to non-proliferation; however, some of its actions contradict its rhetoric. Although Russia's violation of international agreements on non-proliferation is minimal, it is important to understand why Russia transfers nuclear technology. This thesis uses two case studies - Russian nuclear sales to Iran and India - to determine why Russia's actions fail to meet its rhetorical standards.				
14. SUBJECT TERMS Russia, Non-Proliferation, Nuclear, India, Iran			15. NUMBER OF PAGES 71	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release; distribution is unlimited

EVALUATING RUSSIAN DUAL-USE NUCLEAR EXPORTS

Blaine S. Bitterman
Lieutenant, United States Navy
B.S., United States Naval Academy, 1998

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF ARTS IN NATIONAL SECURITY AFFAIRS

from the

NAVAL POSTGRADUATE SCHOOL
June 2007

Author: Blaine S. Bitterman

Approved by: Peter Lavoy
Thesis Co-Advisor

Anne Clunan
Thesis Co-Advisor

Douglas Porch
Chairman, Department of National Security
Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

Non-proliferation is a major concern of the international community, the United States, and Russia. This thesis examines Russia's role in the non-proliferation regime through 2004. Russia has continually said it is committed to non-proliferation; however, some of its actions contradict its rhetoric. Although Russia's violation of international agreements on non-proliferation is minimal, it is important to understand why Russia transfers nuclear technology. This thesis uses two case studies – Russian nuclear sales to Iran and India – to determine why Russia's actions fail to meet its rhetorical standards.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I.	INTRODUCTION	1
A.	NON-PROLIFERATION REGIMES	2
B.	MOTIVATIONS FOR RUSSIAN PROLIFERATION	5
C.	THESIS ORGANIZATION	7
D.	CONCLUSIONS	9
II.	RUSSIA'S NUCLEAR POLICY	11
A.	INTRODUCTION	11
B.	MAKING RUSSIAN POLICY	12
C.	MAKING AND ADMINISTERING NUCLEAR POLICY	14
1.	Ministry of Atomic Energy (MinAtom).....	14
2.	Federal Atomic Energy Agency.....	16
D.	THE BASIS OF RUSSIAN NUCLEAR POLICY	18
1.	Economic.....	19
2.	Strategic.....	21
3.	Private or Bureaucratic Motives.....	22
4.	Fatalism.....	22
5.	Politics as Usual?.....	23
E.	CONCLUSIONS	24
III.	INDIA'S ATV PROGRAM	27
A.	INTRODUCTION	27
B.	THE ADVANCED TECHNOLOGY VESSEL	28
C.	NUCLEAR REACTORS	30
D.	TRAINING AND EXPERTISE	31
E.	CONCLUSIONS	31
IV.	RUSSIA'S ASSISTANCE TO IRAN	35
A.	INTRODUCTION	35
B.	IRAN'S NUCLEAR POWER PROGRAM	35
1.	Arak.....	35
2.	Bushehr.....	36
3.	Tehran.....	38
4.	Training.....	39
C.	CONCLUSIONS	39
V.	CONCLUSIONS	43
A.	REASONS FOR RUSSIAN ASSISTANCE	43
1.	Russian Economic Decline.....	44
2.	Defection of Experts.....	46
3.	Bureaucratic Politics.....	47
a.	Naval Cooperation	48
	LIST OF REFERENCES	51
	INITIAL DISTRIBUTION LIST	59

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

I would like to thank my thesis advisors Professors Peter Lavoy and Anne Clunan for their patience with me through the years in my completion of this project. It has been a long road, but finally we come to a close. I greatly appreciate everything you have done for me and all the help you have provided throughout the years.

Additionally, I would like to thank Greta Marlatt who helped me with that last push for sources. I could not have completed this without her. I would also like to thank Janis Higginbotham for her help in finalizing the format of the thesis.

Lastly, I would like to thank my friends and family who have constantly supported me in the completion of this important step in my life and military career.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

Nuclear proliferation is a top concern of the United States, the Russian government, and the international community. Russia has repeatedly stated its commitment to non-proliferation. On April 28, 2004, the UN Security Council adopted a new resolution that reaffirms the council's commitment to non-proliferation of nuclear weapons. However, even though Russia ascribes to international rhetoric on non-proliferation, it appears that its actions have not met the standards of the international community.¹

States that pursue nuclear power solely as a cheap and efficient alternative to energy production help preserve the Earth's natural resources. However, nuclear weapons programs are often obtained by countries through nuclear power programs and the dual use technology those nuclear power programs provide. Once nuclear technology is obtained, weaponization is generally the easy part of the process.² Therefore, if the underlying motive in obtaining nuclear power is to develop nuclear weapons, then the implications for regional and global stability could be deadly.

This thesis examines the extent and underlying cause of Russian dual-use nuclear technology exports, and also

¹ United Nations Security Council, "Resolution 1540 (2004)" (April 28, 2004), <http://daccessdds.un.org/doc/UNDOC/GEN/N04/328/43/PDF/N0432843.pdf?OpenElement>.

² U.S. Congress, Office of Technology Assessment, *Technologies Underlying Weapons of Mass Destruction*, OTA-BP-ISC-115 (Washington, D.C.: U.S. Government Printing Office, December 1993), 152, <http://www.wws.princeton.edu/cgi-bin/byteserv.prl/~ota/disk1/1993/9344/9344.PDF>.

examines the implications of the presence of dual-use nuclear technology in the global market on regional and global security. The primary reason for Russian exportation of nuclear technology is financial gain.

Russia does not directly sell nuclear weapons, but its support of other nation's nuclear power programs facilitates nuclear proliferation. How has Russia's role in Iran's nuclear power program translated into the prospect of a nuclear weapons program? It is the position of the United States that nuclear power in the hands of authoritarian regimes, such as Iran and North Korea, creates regional and global instability and threatens U.S. national security. The threat to national security comes from the possibility of states sponsoring terrorism by supplying resources to terrorists in the form of weapons and capital. With the proliferation of nuclear power, U.S. leaders fear that terrorist groups will be able to gain control of an active nuclear weapon in the future.

A. NON-PROLIFERATION REGIMES

The proliferation of Weapons of Mass Destruction (WMD) is a concern of the United States, Russia, and the international community alike and has been for quite some time. It is necessary to understand some of the measures, and their successes, that have been put in place throughout the years to curb proliferation.

The International Atomic Energy Agency was created in 1957 by the UN under the auspices of the Atoms for Peace organization in order to encourage the development of atomic energy for peaceful purposes throughout the world. The most important role the IAEA fulfills is ensuring that

atomic energy is used for peaceful purposes and that no material or equipment is applied to military use.³ It became apparent that the Atoms for Peace program was ill equipped to detect or prevent the diversion of the amount of material enough to build a weapon. Therefore, a different program had to be created.⁴

In 1958 Irish Foreign Minister Frank Aiken submitted the first draft of the Nuclear Nonproliferation Treaty (NPT) to the UN General Assembly.⁵ Several drafts and several years later the NPT was finally negotiated in 1968. In 1970 the five nuclear 'haves' (the United States, the former Soviet Union, Great Britain, France, and China) were among the original 43 members. Its efforts were meant to persuade the nuclear 'haves' to eventually disarm and to share peaceful nuclear technology and for the nuclear 'have nots' to not attempt to attain nuclear weapons technology.⁶ Since 1968 the IAEA has fairly successfully enforced the provisions of the NPT by minimizing the amount of states with access to nuclear weapons technology for over thirty years.

Throughout the years the members of the Nonproliferation Regime have created other organizations to help prevent the spread of nuclear weapons technology, weapons delivery technology, and other weapons of mass destruction technology. Organizations such as the Missile Technology Control Regime, the Nuclear Suppliers Group, and

³ International Atomic Energy Agency, "Statute of the IAEA" (Vienna, 2003), <http://www.iaea.or.at/About/history.html>.

⁴ Henry Sokolski, *Best of Intentions: America's Campaign Against Strategic Weapons Proliferation* (Westport, 2001), 33.

⁵ Ibid, 41.

⁶ U.S. Department of State "Treaty on the Non-Proliferation of Nuclear Weapons," <http://www.state.gov/t/np/trty/16281.htm>.

the Australia Group, effectively prevented the spread of undesirable technology by creating elite and discriminatory groups.⁷ Russia is a member of all except for the Australia group. In January 1992, the United Nations Secretary General readdressed the issue of proliferation in a Presidential Statement which stated that "the proliferation of all WMD constitutes a threat to international peace and security, and underlines the need for member states of the UN to prevent proliferation."⁸ This statement serves to reemphasize the importance of maintaining proliferation of nuclear weapons technology as close to zero as possible.

The Proliferation Security Initiative (PSI) is the newest attempt to prevent the proliferation of weapons of mass destruction. It was announced by President Bush on May 31, 2003 to pose a multinational response to the continually increasing efforts of rogue nations and other prospective proliferators. There are currently over one hundred signatories to PSI.⁹ This is a critical step towards implementing the UN Security Council Presidential Statement of January 1992.¹⁰ In 2004, Russia committed itself as the fifteenth participant in PSI.¹¹

⁷ Sokolski, *Best of Intentions: America's Campaign Against Strategic Weapons Proliferation* (Westport, 2001), 6-7.

⁸ U.S. Department of State Fact Sheet, "Proliferation Security Initiative: Statement of Interdiction Principles" (Washington D.C., September 4, 2003), <http://www.state.gov/t/np/rls/fs/23764.htm>.

⁹ Andrew C. Winner, "The Proliferations Security Initiative: The New Face of Interdiction," *The Washington Quarterly* (Spring 2005).

¹⁰ U.S. Department of State Bureau of Public Affairs, "Proliferation Security Initiative" (Washington, D.C., September 15, 2003), <http://www.state.gov/r/pa/ei/rls/24134.htm>.

¹¹ Jeremy Bransten, "Russia Joins U.S. Led-Initiative on WMD," *Radio Free Europe/Radio Liberty* (June 2, 2004), <http://www.rferl.org/featuresarticle/2004/6/BCE976F8-687C-4B2B-B1EF-F94ACB605969.html>.

B. MOTIVATIONS FOR RUSSIAN PROLIFERATION

To what extent and why does Russia export dual-use nuclear technology to countries of proliferation concern (e.g., Iran and India)? In the post-Cold War era, Russia's ability to maintain its nuclear arsenal and its nuclear research program diminished as its economic situation worsened. Economic decline has made it difficult for Russia to support the program that ensured its superpower status. This economic decline is the primary reason Russia exports dual-use nuclear technology.

Not only is it hard for Russia to economically maintain disarmament goals established by non-proliferation treaties, but Russia also struggles to maintain the quality of life and standard of living for its technicians and experts as the priority for nuclear research programs has gone by the wayside. As these experts' compensation and benefits decline the threat of information, technology sales, and even defection to non-nuclear states by private actors increases. Similarly, due to the declining standard of living for nuclear technicians it is just as challenging to recruit new engineers to help maintain technological advances in the future, to include safety lockouts and safe handling procedures.

Strategic cooperation is the secondary reason that Russia exports nuclear technology. Russia feels that if it can get a foothold in the economies and policies of countries such as India and Iran, it will have a basis to affect the way decisions are made in those regions. By selling India and Iran nuclear technology, Russia will be providing them with needed services that can be turned on or off depending on how satisfied Russia remains with the

regional policies. Additionally, cooperation with these countries gives Russia an opportunity to build strategic regional alliances throughout the world.

Finally, bureaucratic politics is a tertiary factor that has led Russia to export nuclear technology. The Russian Ministry of Atomic Energy attempted to maintain its current status and improve its program priority into the future. I will argue that it often looked to exploit loopholes in the Nuclear Non-Proliferation Treaty (NPT) in order to obtain capital from foreign countries by selling dual-use nuclear technology.

Understanding the extent and reasons Russia played (or continues to play) a role in the past in the exportation of dual-use nuclear technology will assist in formulating cogent non-proliferation policy. It is imperative all Nuclear powers work together with Russia to prevent further nuclear proliferation in order to prevent rogue states from obtaining nuclear weapons. Concerns of diverted fissile material and/or scientific defection from Russia to countries such as Iran, North Korea, or Syria continue to remain prevalent in the international community. According to a survey published in a Program on New Approaches to Russian Security (PONARS) by Deborah Yarsike Ball and Theodore P. Gerber, "roughly 20 percent of Russian physicists, biologists, and chemists said they would consider working in rogue nations..."¹²

¹² Deborah Yarsike Ball and Theodore P. Gerber, "Will Russian Scientists go Rogue? A Survey on the Threat and the Impact of Western Assistance," PONARS Policy Memo 357 (November 2004), 1.

C. THESIS ORGANIZATION

The first chapter will address the argument that Russia has encouraged, nuclear proliferation through the sale of dual-use nuclear technology because of its declining economic situation and internal bureaucratic politics. Russia has sold dual-use nuclear technology to countries whose future intentions may be destabilizing to regional and global stability. These intentions could include the future proliferation of nuclear technology or the sale of nuclear weapons to non-state actors.

Chapter II examines the evolution of the Russian atomic energy agency. Additionally, it inspects the leadership of that and follow-on agencies, and how they manage nuclear policy. Lastly, after giving the reader an understanding of the basis on which Russian foreign and domestic nuclear policy is formulated, this chapter develops the key factors for Russia's export of dual use nuclear technology.

Chapter III studies why Russia is considering selling India nuclear technology and nuclear submarines. Since 1998 Russia has provided India's Advanced Technology Vessel (ATV) nuclear submarine program assistance, including assistance in installing propulsion reactors for the two submarines laid down under this program.¹³ The ATV might be able to launch nuclear-capable missiles. This possible capability is also reported to have been initially headed by a Russian scientist.¹⁴ Russia previously leased an older

¹³ "Russia helps India build nuclear submarine," *Bellona Foundation* website, <http://www.bellona.org/e/russia/nfl/news/980917-2.htm>.

¹⁴ Rahul Bedi, "Agni II Now in Production," *Jane's Missiles and Rockets*, Vol. 5, No. 8, August 1, 2001; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

nuclear Charlie I class submarine to India with a Russian crew operating the reactor.¹⁵ If the sale of nuclear propulsion reactors to India does not happen, then it is also possible that India will purchase or lease one or more Russian nuclear submarines. These submarines may be operated by only Indian crews.¹⁶ Why is Russia willing to sell nuclear submarines and technology to India, potentially allowing that technology to be available on the global market?

Chapter IV inspects why Russia provided Iran nuclear aid and continues to make arrangements for continued support. When the nuclear power plant at Bushehr becomes operational, how will Iran operate it and what will happen to the spent fuel? Russia has stated that it would take back all of Iran's spent fuel. However, given Russia's economic weakness and its inability to take care of its own spent fuel and decommissioned naval vessels,¹⁷ this scenario may not be as certain as Russia would like the international community to think. Why would Russia accept this economic burden if it was unable to carry it out? Further, if it is unable to carry it out why would Russia risk leaving Iran with spent nuclear fuel, potentially enabling its use in a nuclear weapons program. Also, Russia plans on operating the Bushehr Nuclear Power Plant with a mixed Russian-Iranian crew of which about 100

¹⁵ "Russia: Nuclear Exports to India: Training and Know-How," NTI website, <http://www.nti.org/db/nisprofs/russia/exports/rusind/nuknow.htm>.

¹⁶ Ibid.

¹⁷ Cristina Chuen, "Russian Nuclear Exports to Iran: U.S. Policy Change Needed," *Center for Nonproliferation Studies*, <http://cns.miis.edu/pubs/week/030327.htm>.

Iranian specialists are currently being trained in Moscow.¹⁸ Again, the possibility of Iranian control of spent nuclear fuel and the existence of trained specialists solicits the question of why Russia would run the risk of giving Iran all the tools to create its own nuclear weapons program.

Chapter V offers conclusions about the factors that have caused Russia to support dual-use nuclear exports. Implications for the United States, Russia, and the international community of future proliferation are also discussed, as well as recommendations to prevent this from continuing to happen.

D. CONCLUSIONS

There are a variety of reasons Russia continues to export dual-use nuclear technology. The primary reason is economic gain. The revenues Russia has received from nuclear sales helps maintain its failing nuclear industry as well as its failing defense industry. Another reason is strategic cooperation. The two case studies examined reveal a long standing tradition of strategic cooperation with Russia and India and Russia and Iran. Indications are that Russia wishes to foster this cooperation with India and Iran. Another possibility is that Russia fully supports nuclear non-proliferation and it feels it is fully complying with international standards. Pressures from the United States and the international community for Russia to stop certain actions that can be construed questionable, but do not violate any treaties, are usually met with a cold shoulder by Russia. Additionally, Russia will

¹⁸ Interfax, May 28, 2002; in "Russia to train around 100 Iranian engineers to operate Bushehr-1 nuclear plant," FBIS Document CEP20020528000137.

continue to argue that none of its actions violate international agreements and will continue to act in manners it perceives are beneficial to Russia. In many cases this may include stopping previous support and sales to countries like Iran and India.

II. RUSSIA'S NUCLEAR POLICY

A. INTRODUCTION

Russian nuclear policy after the Cold War has and continues to change immensely. The recent and continuing transition to democracy in Russia is driving these changes, as well as the way the world has been transforming. Nuclear non-proliferation took on a new importance following the end of the Cold War and even more so since September 11, 2001. However, both the United States and the Soviet Union have sold nuclear technology to non-nuclear states in the past. After the Cold War, both superpowers realized it would be to their advantage to support the non-proliferation regime. Both Russia and the United States realized that the possibility of nuclear technology escaping from the former Soviet Union had significantly increased.¹⁹

An examination of the role of nuclear policy in the Russian Federation government is necessary to understand why Russia continues to transfer dual-use nuclear technology and initially refrained from one of the most current efforts to prevent nuclear proliferation (the Proliferation Security Initiative). This chapter explains how domestic and foreign nuclear policy is made in Russia. Additionally, this chapter describes who administers nuclear policy in Russia and how. Lastly, this chapter discusses the basis on which Russian domestic and foreign nuclear policy is formulated, and the key factors why it has exported and continues to export nuclear technology.

¹⁹ Henry Sokolski, *Best of Intentions: America's Campaign Against Strategic Weapons Proliferation* (Westport, 2001), 6-7.

B. MAKING RUSSIAN POLICY

Who makes Russian policy and, more specifically, who makes Russian nuclear policy? Although Russia began to transition to a democratic state over ten years ago, it still has not fully democratized. The Russian Constitution affords an immense amount of power to its President. This hyper-presidential system makes it extremely hard to remove the elected president from office. Even in the last months of Yeltsin's term, when his popularity dropped to single digits, it would have been next to impossible to remove him from office. Instead, he resigned in order to give his designated successor, Vladimir Putin, the upper hand in the next election by allowing Putin the luxury of serving in office prior to the popular election.²⁰ The Russian President has more power than the U.S. President, or more accurately the Russian Parliament (Duma) and the Russian judicial system have less ability than their counterparts in the United States to check the Russian President. Even policies which are unpopular with the Russian Parliament will not affect the Russian President or his reelection; therefore, policies which strengthen the state's presidential system are more likely to be implemented.²¹

Additionally, over the past four years, President Putin has taken extraordinary measures to restrict the freedom of the Russian media. There are very few media outlets in Russia that are not state run, and the ones that are not, tend to censor themselves in order to avoid state action. With this control over the press, Putin is able to shape public opinion in ways that he believes are for the

²⁰ Archie Brown, *Contemporary Russian Politics: A Reader* (Oxford, 2001), 85.

²¹ Lilia Shevtsova, *Putin's Russia* (Washington, D.C., 2003), 8.

good of the state.²² By doing this, President Putin's popularity remained high throughout his first term, and enabled him to be re-elected in 2004 with a vast majority of the popular vote. Whether the election was free and fair is an argument within Russia's population (specifically fueled by Putin's opposing candidates) and within the international community. Reported in the Radio Free Europe/Radio Liberty's January 8, 2004, issue of *(Un)Civil Societies*, many of the liberal parties united to boycott the Russian presidential election. Yabloko leader Grigorii Yavlinskii was specifically quoted as saying "free, equal, and politically competitive elections are impossible."²³ Although this sentiment was really carried over from the December 2003 elections, it held true throughout the March 2004 presidential elections.

Putin's second term will be a defining moment for Russia. In his first term, Putin consolidated much of his power and strengthened the presidency. The target of his first term was the oligarchy and early indications are that the bureaucracy will be the target of his second term. After the re-inauguration on May 7, 2004, expectations were that 25 percent of the 1,000 presidential staff members were be cut, along with 20 percent of the overall government. However, the money saved will not go back into the state, but toward increasing senior officials' salaries.²⁴ This will mean that some of the government organizations to include the nuclear industry will still

²² Shevtsova, *Putin's Russia*, 8, 176-7.

²³ "Russian Election Boycott: Treading a Fine Line," Radio Free Europe/Radio Liberty (January 8, 2004, Vol. 5, No. 1), <http://www.rferl.org/reports/ucs/2004/01/1-080104.asp>.

²⁴ *The Economist*, "Slaying his own dragons" (May 1, 2004), 50-51.

have economic shortfalls. This will create the need for those organizations to infuse money into their organizations any way they can. For the Atomic Energy Agency that may mean foreign sales to countries like Iran and India.²⁵

C. MAKING AND ADMINISTERING NUCLEAR POLICY

1. Ministry of Atomic Energy (MinAtom)

There have been several agencies in the Soviet Union and Russia assigned to oversee the development, production, testing, and delivery of nuclear energy and nuclear weapons. The first was called the Council of Ministers (1945-1953). It was replaced by the Ministry of Medium Machine-Building from 1953-1986, and the last Soviet organization was the Ministry of Atomic Power and Industry (MAPI) from 1986-1992. Under Soviet rule, these agencies were power brokers with a lot of influence on the USSR's decision-making loop.²⁶ Since the fall of the Soviet Union, the Ministry of Atomic Energy has been the agency in charge of Russia's nuclear industry; however, its influence waned, which is evident with the changes of leadership throughout the years as I will show in the following section.

The first director of MinAtom was Viktor Mikhailov from 1992 until his unexpected retirement in 1998. During this time, nuclear material was heavily guarded and nuclear security continued to be taken very seriously. However, deals on nuclear exports were comparatively liberal.

²⁵ Celeste Wallander, "Russia's Interest in Trading with the 'Axis of Evil,'" Testimony for "Russia's Policies Toward the Axis of Evil: Money and Geopolitics in Iraq and Iran," Hearing before the House Committee on International Relations, February 26, 2003.
http://www.house.gov/international_relations/108/wall0226.htm.

²⁶ Federation of American Scientists, "Ministry of Atomic Energy (Minatom)," <http://www.fas.org/nuke/guide/russia/agency/minatom.htm>.

Strategic nuclear cooperation with Iran commenced under Mikhailov's watch.²⁷ The first change of leadership to MinAtom indicated no change in the influence of the Nuclear Ministry upon Russian policy since the person who replaced Mikhailov was a protégé of his and held similar views on nuclear power. When Mikhailov retired, Western hopes were that US-Russian nuclear cooperation would be strengthened, but when Yevgeny Adamov assumed the responsibilities as the head of Russia's Nuclear Ministry, those hopes were dashed.

When he became the new Minister of Atomic Energy, Adamov continued nuclear cooperation with Iran (which the United States had hoped would be discontinued) and he instituted other questionable and corrupt policies.²⁸ Adamov used his position as the head of MinAtom to strengthen his financial position, to appoint business associates to key positions, and to undermine Russia's non-proliferation obligations. During his time in charge, most of MinAtom's budget was kept secret making the ministry prone to accusations of concealing information on nuclear deals and participating in fund misappropriations.²⁹ The primary reason for Adamov's dismissal, according to Boris Nemtsov, a member of the State Duma, was that information about corruption within the ministry had been spread throughout the Duma. But other speculations on the reason of the dismissal include that Adamov was one of the last

²⁷ Igor Khripunov, "Russia's Nukes: MinAtom at the Edge," *Bulletin of the Atomic Scientists* (May/June 1999, Vol. 55, No. 3).

²⁸ Craig Cerniello, "Yeltsin Government Shake-Up Unlikely to Affect Arms Control," *Arms Control Today* (March 1998), http://www.armscontrol.org/act/1998_03/shakeup.asp.

²⁹ Rashid Alimov and Igor Kudrik, "Adamov sacked for unprofitable proliferation" (March 29, 2001), <http://www.bellona.no/en/international/russia/waste-mngment/20030.html>.

remaining members of the Yeltsin government and Putin replaced him in order to strengthen his control.³⁰

Alexander Rumyantsev replaced Adamov on March 28, 2001. Rumyantsev continued many of the cooperative programs already in place, specifically cooperation with Iran, but he made many changes within the ministry. He reduced the employment of the organization to six hundred from three thousand (designed to enable the ministry to run more effectively). Additionally, he reinitiated the attempt to incorporate all atomic activities under one State-owned nuclear corporation. These actions indicate that he is an economic liberal.³¹ These indications lend credibility to the theory that Putin appointed Rumyantsev to regain control of Russia's nuclear complex.

2. Federal Atomic Energy Agency

On February 24, 2004, President Putin dismissed the Russian government and on March 9 appointed a new government with major structural changes. Part of the structural changes included cutting 13 ministries, one of which was the Ministry of Atomic Energy. This action reduced MinAtom's role in the Russian government. Rather than merging with the Ministry of Energy, MinAtom has been renamed the Federal Atomic Energy Agency (FAEA) and is still headed by Rumyantsev. When asked if he preferred merging with the Ministry of Energy or being reduced in

³⁰ Thomas Nilsen and Vlad Nikiforov, "Adamov fired" (March 28, 2001), <http://www.bellona.no/en/international/russia/waste-mngment/20006.html>.

³¹ World Investment News, "Interview with Mr. Alexander Yu. Rumyantsev" (April 29, 2002), <http://www.winne.com/topinterviews/yu.htm>.

rank within the executive hierarchy, but still maintaining an indigenous and separate nuclear sector, Rumyanstev told Moscow Rossiyskaya Gazeta:

Of course, the second, preserving the unity of the sector. For me this is not even a question. And I and all my predecessors have invariably defended the unity of the nuclear-power-generation complex. It took form in our country in a completely special manner – a unified structural unit, a unified network of design organizations, and the centralized production of dual-use nuclear materials. Try to divide this up and the consequences could be deplorable.³²

FAEA fell under the Ministry of Industry and Science directed by Viktor Khristenko for approximately four months, but in late May President Putin released a new decree placing the FAEA directly under the Prime Minister, Mikhail Fradkov.³³ It is unclear why this move was made in such a short time after changing the organization of the government. Khristenko was certainly qualified to run his department with the FAEA in it, and he has had extensive experience in developing Russia's economic infrastructure and has a background as a strong economic reformist.³⁴ However, this change may be to give FAEA a higher status, but the question remains as to why Putin demoted the Ministry in the first place. Certainly, time is needed to effectively evaluate the direction President Putin and his newly appointed government will take Russia and its ministries. Optimists for Russia's development analyze

³² Aleksandr Yemelyanenko, "Former Russian Atomic Energy Minister Interviewed on Sector's Reduced Status," *FBIS*, March 23, 2004.

³³ "Russian Government Restructuring and the Future of WMD Threat Reduction Cooperation," RANSAC Policy Update (May 21, 2004), <http://www.ransac.org/Documents/rfgovtreorgupdate05212004.pdf>.

³⁴ Pravda.RU, "President Putin dismisses Cabinet" (February 24, 2004), <http://newsfromrussia.com/main/2004/02/24/52476.html>.

many of President Putin's actions as necessary steps for reform and pessimists argue that he has taken too much liberty in controlling liberal organizations, such as the media. Now that Putin has been reelected, the actions he and his administration take in his second and last term as president may well determine the future of Russia.

D. THE BASIS OF RUSSIAN NUCLEAR POLICY

On what basis has Russia formulated its nuclear policy? There are several different possible sources for Russia's decisions on nuclear policy. The two most obvious reasons are economic gain and strategic cooperation. Other drivers of Russian nuclear policy are making political statements, research and development, energy concerns, and environmental considerations.

According to Jacob Viner, power is inseparable with wealth:

I believe that practically all mercantilists, whatever the period, country, or status of the particular individual, would have subscribed to all of the following propositions: (1) wealth is an absolutely essential means to power, whether for security or for aggression; (2) power is essential or valuable as a means to the acquisition or retention of wealth; (3) wealth and power are each proper ultimate ends of national policy; (4) there is long-run harmony between these ends, although in particular circumstances it may be necessary for a time to make economic sacrifices in the interest of military security and therefore also of long-run prosperity.³⁵

³⁵ Jacob Viner, "Power Versus Plenty as Objectives of Foreign Policy in the Seventeenth and Eighteenth Centuries," *World Politics* (Vol. 1, No. 1, October 1948), 10.

In Russia's case, it seems that remains the case. Although Russia is definitely still a world power, its economic decline has caused its power and international influence to wane slightly. Using Viner's model it is difficult to separate the economic reasons and the strategic reasons. By examining the long term effects of a strong economy, one can postulate economic power would improve Russia's strategic standing in the world. In fact, a weak economy is one of the few things currently preventing Russia from regaining the status held by the old Soviet Union. Russia's economy did very well in 2003 (7.3 percent growth rate); however, that figure may be somewhat misleading. Growth for 2003 was largely based on greater commodity exports and the wealthiest 20 percent of the population accounting for 46 percent of total revenues.³⁶ Additionally, this upward rate appears to be sustaining itself.³⁷

1. Economic

By selling nuclear technology and engaging in dual-use nuclear exports, Russia is able to remain competitive in the nuclear sector by using capital gains to fund further projects that include advanced research and development. However, the spent nuclear fuel project between Russia and Iran may only be able to fund safe storage of the spent fuel imported from Iran and other existing materials, leaving little capital left for research and development

³⁶ Peter Aven, "Russian Economic Growth: Glass Half Empty or Half Full?" (April 29, 2004), *Alfa Bank Bulletin*, <http://www.alfabank.com/media/clippings/2004/04/29/>.

³⁷ World Bank Group website, <http://web.worldbank.org>.

and advanced projects. This may cause the Federal Atomic Energy Agency to cut corners, possibly leading to unsafe practices.³⁸

In President Putin's State of the Nation address on May 26, 2004, he emphasized economic growth as his number one priority for the future.

We must grow faster than the rest of the world if we want to take the lead in today's difficult conditions of global competition. We must be ahead of other countries in our growth rate, the quality of our goods and services and level of our education, science and culture. This is a question of our economic survival. It is a question of ensuring that Russia takes its deserved place in these changing international conditions.³⁹

Putin stated later in his address that he hoped Russia's per capita GDP would double by 2010.⁴⁰ Nuclear exports add to Russia's overall GDP and are a good way to help it obtain Putin's goals. By selling nuclear reactors and technology within the constraints of international agreements to Iran, Russia is able to stimulate its economy during its weaker stages and help it grow stronger.⁴¹

Sales from nuclear materials and technology ranged from 2 to 2.5 billion US dollars in the early 1990s. This money, although small in relation to Russia's overall export economy, helps keep the industry alive as well as

³⁸ Chuen, "Russian Nuclear Exports to Iran: U.S. Policy Change Needed."

³⁹ President Vladimir Putin, "Address to the Federal Assembly of the Russian Federation" (May 26, 2004), <http://www.cdi.org/russia/johnson/2004-state-nation.cfm>.

⁴⁰ Ibid.

⁴¹ Wallander, "Russia's Interest in Trading with the 'Axis of Evil.'"

help pay the technicians and experts keeping them employed in Russia and reducing the proliferation risk.⁴²

2. Strategic

For Russia to export dual-use nuclear technology seems to be contrary to its security interests. By maintaining itself as a nuclear power and preventing other countries from obtaining nuclear weapons, Russia will continue to maintain its superpower status. However, if its economy does not improve, its nuclear infrastructure will continue to fail. By preventing other countries from becoming nuclear powers, Russia would be able to keep the membership in that elite club to a minimum.

I will argue the strategic reason Russia is selling nuclear technology to countries such as Iran and India is to gain a foothold in their markets.⁴³ The economic reasons, although very strong, start to fall apart when one examines some of the technology being sold to Iran. Centrifuges and laser technology are used for uranium enrichment and further Iran's indigenous nuclear program.⁴⁴ By allowing Iran or India to create an indigenous nuclear fuel cycle, Russia would forfeit the sales it would gain by selling nuclear fuel and accepting that fuel back.⁴⁵ Concurrently, if the Russian 'state' does not want Iran to have a nuclear weapons program, then sales that further

⁴² Wallander, "Russia's Interest in Trading with the 'Axis of Evil.'"

⁴³ Ibid.

⁴⁴ Chuen, "Russian Nuclear Exports to Iran: U.S. Policy Change Needed."

⁴⁵ Ibid.

uranium enrichment are contrary to those policies, since once the indigenous programs are in place, weaponization is relatively easy.⁴⁶

3. Private or Bureaucratic Motives

One possible explanation for Russia allowing countries to obtain fuel cycle technology is that bureaucratic actors are using short term economic gain as a model. Those bureaucrats may be willing to forgo the prospect for long term revenues, because they are only interested in the immediate capital gains. These immediate capital gains are generally used to keep their bureaucracies afloat, by paying unpaid bills as well as providing regional politicians with 'compensation' in return for their support of nuclear programs. However, if Iran is able to develop an entirely indigenous program, this definitely presents a problem in terms of non-proliferation and lost revenues for Russia.⁴⁷

4. Fatalism

Another possible reason is fatalism. According to Colonel L.A. Kononov:

Especially favorable conditions for nuclear weapons proliferation have formed in recent years. The saddest thing is that it is impossible to eliminate them in the near term. This process is occurring at the present time and from all appearances will continue subsequently despite all efforts by the international community to prevent it.⁴⁸

⁴⁶ Sokolski, *Best of Intentions: America's Campaign Against Strategic Weapons Proliferation* (Westport, 2001), 6-7.

⁴⁷ Wallander, "Russia's Interest in Trading with the 'Axis of Evil.'"

⁴⁸ L. A. Kononov, "RF, World Nuclear Security, Need for Changed Nuclear Policy in the Modern World," *FBIS*, December 14, 2000.

If this type of fatalism is prevalent in the Russian community and government, believing that it is impossible to prevent nuclear proliferation, then it is possible that Russia would be willing to sell dual-use nuclear technology to states such as Iran. Russia may be willing to sell technology even though it might mean accepting another country into the nuclear club, because it is inevitable that those countries will become nuclear "haves" even without Russia's help.

5. Politics as Usual?

Russia has treaded a fine line regarding proliferation of dual use nuclear exports to India and Iran; however has done nothing blatantly against the Nuclear Non-Proliferation Treaty. It has been discouraged numerous times from selling Iran nuclear technology, but has continued to do so despite objections from the international community.

The U.S. withdrawal from the ABM Treaty and its subsequent pursuit of National Missile Defense made Russia look weak and unable to prevent this from happening or simply unable to exert influence on the United States anymore. Many actions Russia has taken since then have been attributed to retaliation for the U.S. withdrawal even though Russia denies any reprisals. On 16 August 2002, Defense Minister Ivanov confirmed a statement by a defense official that Russia had decided to keep two divisions of its MIRVed nuclear missiles, but that it was not a response to the U.S. withdrawal from the ABM treaty or its National Missile Defense Program. In response to these actions, Ivanov stated:

The decision to preserve heavy missiles is not "retaliation" for the U.S. withdrawal from the ABM Treaty but a "planned measure directed toward the development of the country's nuclear deterrent forces"⁴⁹

But the Russian media came to different conclusions. The *Nezavisimaya Gazeta* decided that "Moscow has come up with solutions that can unequivocally be described as retaliatory steps for the American secession from the ABM Treaty."⁵⁰

Even though Russia's nuclear export policy predates the U.S. decisions to withdraw or not participate from bilateral and international treaties and agreements (such as the ABM Treaty and the Kyoto Protocol), the continuance of those policies in the face of U.S. disapproval serves as a reminder to the United States and the international community that Russia can not be influenced in decisions it believes are of a sovereign nature and stresses that it has an autonomous foreign policy.⁵¹

E. CONCLUSIONS

Russia's nuclear policy has had many different people in the driver's seat throughout the years, but has not significantly changed the way business is conducted. The primary reason for dual-use nuclear exports in the Yeltsin era was economic gain. That holds true today under Putin's watch. Although Putin has implemented numerous governmental reforms, those reforms have really only served to strengthen his control and have not changed any

⁴⁹ FBIS Media Analysis, "Russia - Press Views Retention of Heavy Missiles as Answer to US NMD, Defeat for Kvashnin Reform," August 30, 2002.

⁵⁰ Ibid.

⁵¹ Wallander, "Russia's Interest in Trading with the 'Axis of Evil.'"

policies. Economic gain continues to be an important reason because of Russia's weak economy. Once the economy strengthens, there is certainly the possibility that nuclear exportation continues, but I would argue at that point other motives would become the primary drivers. Once the domestic economy strengthens, one will probably see more strategic reasons for foreign exportation of nuclear materials and technology.⁵²

Although capital gain is the primary reason Russia bases its nuclear policy, there are certainly other considerations that enter into the debate, including strategic concerns and national will. Telling any state what it can and can not do, even if it has already agreed upon it formally, is a dangerous game and must be done very carefully. This is particularly true with a country such as Russia, which is still very much a world power although less of a Superpower than it used to be. Russia will continue to flex its national will and ensure the international community is well aware that it is an autonomous actor and makes foreign policy decisions based on the good of Russia versus any political pressure from the international community.

⁵² Wallander, "Russia's Interest in Trading with the 'Axis of Evil.'"

THIS PAGE INTENTIONALLY LEFT BLANK

III. INDIA'S ATV PROGRAM

A. INTRODUCTION

Why is Russia willing to sell India nuclear submarines and technology possibly allowing that technology to be available on the global market? Since 1998 Russia has been providing assistance to India's Advanced Technology Vessel (ATV) nuclear submarine program to include assistance in the installation of propulsion reactors for the two submarines laid down under this program.⁵³ The ATV may be capable of launching nuclear-tipped missiles. This portion of the program is also reported to have been initially headed by a Russian scientist.⁵⁴ In the past Russia leased an older nuclear Charlie I class submarine to India with a Russian crew operating the reactor.⁵⁵ If the sale of nuclear propulsion reactors to India does not happen, then it is also possible that India will either purchase or again lease one or more Russian nuclear submarines, which would be operated solely by Indian crews.⁵⁶

If India is able to obtain the technological ability to build its own naval nuclear reactors, the possibility (however slight) of non-state actors, such as terrorist cells, acquiring nuclear technology increases. Additionally, there are no international safeguards or agreements to prevent India from selling nuclear submarines to Iran or North Korea once it is able to establish its own

⁵³ "Russia helps India build nuclear submarine," Bellona Foundation website, <http://www.bellona.org/e/russia/nfl/news/980917-2.htm>.

⁵⁴ Bedi, "Agni II Now in Production."

⁵⁵ "Russia: Nuclear Exports to India: Training and Know-How," NTI website, <http://www.nti.org/db/nisprofs/russia/exports/rusind/nuknow.htm>.

⁵⁶ Ibid.

program. India is not a party to the Non-Proliferation Treaty, therefore has no requirement to adhere to the provisions provided within it about not transferring nuclear materials to third parties. Although there are provisions from the NPT to prevent any nuclear material India acquires directly from another country from getting into the hands of a third party, any program India achieves indigenously will not be internationally safeguarded.⁵⁷

B. THE ADVANCED TECHNOLOGY VESSEL

The Advanced Technology Vessel has been a concept India has been attempting to achieve since the 1970's. At its inception the ATV program was envisioned as a vessel capable of tracking superpower navies in the Indian Ocean, but today it is seen as a cruise missile submarine, which will one day be capable of deploying nuclear tipped missiles. According to *Asian Military Review*, the ATV will have a (approximately) 100Mw pressure water reactor, which has been tested at Indira Gandhi Centre for Atomic Research Kalpakkam near Chennai.⁵⁸

The director of India's ATV program is Vice Admiral Ganesh (ret.). VADM Ganesh was the first Captain of the INS Chakra, the Soviet Charlie II class nuclear submarine India leased from 1988-1991.⁵⁹ The initial design of the ATV was based on the Charlie II submarine and the design

⁵⁷ "Treaty on the Non-Proliferation of Nuclear Weapons" (March 5, 1970), <http://www.fas.org/nuke/control/npt/text/npt2.htm>.

⁵⁸ M. V. Ramana, "An Estimate of India's Uranium Enrichment Capability," *Science and Global Security* (December 2004), http://www.princeton.edu/~globsec/publications/pdf/12_1-2_ramana.pdf.

⁵⁹ Surya Gangadharan, "Nuclear Reactor for ATV Ready," *Strategic Affairs Magazine* (December 16, 2001), <http://www.stratmag.com/issue2Dec-15/page02.htm>.

was obtained (less the reactor design) from Russia.⁶⁰ More recent reports indicate that the design is based on Russia's fourth generation nuclear submarine, the Sevorodvinsk.⁶¹ West Germany and Russia provided access to India to their reactors used on the nuclear submarines the Otto Hahn and the Lenin, respectively.⁶² Further research into the ATV's reactor is reported to have included a Japanese naval nuclear reactor and the likelihood of it being suitable for use in a submarine.⁶³ Despite reports that indicate otherwise, India has yet to successfully test a nuclear reactor for its ATV program, and it is actively pursuing leasing two nuclear submarines from Russia until the ATV can be commissioned, but according to Russian sources the negotiations have been frozen due to funding problems.⁶⁴ Other reports indicated the lease of the two Russian nuclear submarines was initially part of the Admiral Gorshkov deal, in which India purchased the Kiev-class aircraft carrier from Russia on January 21, 2004, for 1.5 billion.⁶⁵ India's and Russia's defense ministers both denied that deal included the lease of two Russian Akula class nuclear submarines.⁶⁶ In an article from *The Times of*

⁶⁰ Gangadharan, "Nuclear Reactor for ATV Ready."

⁶¹ PIR-Center for Policy Studies in Russia, "Indian Nuclear Submarine Fleet Development Program: Russian Participation" (March 15, 1999), <http://www.nyu.edu/globalbeat/southasia/PIR031599.html>.

⁶² Center for Nonproliferations Studies: Nuclear Threat Initiative database, "Russia: Nuclear Exports to India: Developments," <http://www.nti.org/db/nisprofs/russia/exports/rusind/nukedev.htm>.

⁶³ Ibid.

⁶⁴ "Delhi to lease Russian SSNs," *Jane's Defence Weekly* (February 6, 2002), <http://jdw.janes.com>.

⁶⁵ Center for Nonproliferations Studies: Nuclear Threat Initiative database, "Russia: Nuclear Exports to India: Developments."

⁶⁶ Yahoo! India News, "Deal Done, Gorshkov Awaits New Garb and Master" (January 21, 2004), <http://in.news.yahoo.com/040120/58/2b12d.html>.

India of the same day, the deal was touted as the launch pad for a nuclear deal on the Akula submarines as well as long range bombers capable of delivering nuclear weapons.⁶⁷

According to Jane's Defence Weekly, the ATV may be ready for operational trials in 2008-2009. Reported assistance from Russian experts helped overcome design problems with the miniaturization and incorporation of the nuclear reactor for the vessel. The same source indicated that the deal to lease the two Akula submarines with an option to lease a third was finalized in order to provide India with a submarine based Minimum Nuclear Deterrence (MND) until the ATV becomes operational.⁶⁸

C. NUCLEAR REACTORS

In 1998, Russia and India finalized a nuclear reactor deal (two 1000Mw light water reactors at Koodankulam) that had been in the making since 1987; just three weeks after India conducted nuclear weapons testing. Although the concern over Russian assistance to an Indian civilian nuclear power program was higher in 1998, it waned in the years following international realization that India had fully weaponized. However, it is still a valid concern that Russia continues to assist a country in its nuclear power program that has not signed on to the Nonproliferation Treaty.⁶⁹

⁶⁷ Manoj Joshi, "Nuclear Wishlist Is Heart of Carrier Deal," The Times of India (January 21, 2004), <http://timesofindia.indiatimes.com/articleshow/435662.cms>.

⁶⁸ Rahul Behdi, "Russians Help India to Solve SSN Snags," *Jane's Defence Weekly* (May 19, 2004), <http://jdw.janes.com>.

⁶⁹ Center for Nonproliferation Studies: Nuclear Threat Initiative database, "Russia: Nuclear Exports to India: Reactors," <http://www.nti.org/db/nisprofs/russia/exports/rusind/react.htm>.

D. TRAINING AND EXPERTISE

Indications are that Indian scientists and technicians are continually undergoing training at Russia's Novovoronezh facility in order to operate and maintain the power plant at Koodankulam.⁷⁰ In the event of the Akula lease being finalized on India's terms of having only Indian crews onboard (vice the reactor being operated by a Russian crew as was the previously leased Charlie II), those crews would receive training in Russia. It was reported in 2002 that an Indian Navy submarine crew was training in Russia on an Akula II submarine.⁷¹

Training of scientists and submarine crews expedite India obtaining an indigenous nuclear submarine program. Additionally, any assistance Russia provided in the miniaturization and incorporation of the naval nuclear reactor into India's ATV increased India's expertise and enabled it to be much closer to its goal of a submarine based MND.

E. CONCLUSIONS

Russia's assistance to India's nuclear submarine program can primarily be attributed to the capital gains involved from selling the naval nuclear reactor technology to India. Russia's goal as a state is to ensure its survival in the international system. Although guarding state secrets and power resources is one way to ensure the attainment of that goal, another sure way is to ensure economic strength.

⁷⁰ Center for Nonproliferation Studies: Nuclear Threat Initiative database, "Russia: Nuclear Exports to India: Developments."

⁷¹ Ibid.

Although capital gain is likely the primary reason, bureaucratic politics also play an important part. Nuclear research and development (R&D) program funding increases when R&D programs help to attain the capital gains.⁷² If Russia's nuclear agency is able to lobby the Russian government and convince them that aiding India in its nuclear endeavors will be beneficial to Russia in the long run, then MinAtom secures its future survival within the Russian state by creating a future role for itself in the way of continued research and development.⁷³ Bureaucratic politics is also present when it comes for the Russian Navy's requirement for future funding. If the Russian Navy lobbies the Russian government to aid the Indian government, it stands to improve allied relations with the possibility of gaining a warm water naval base in the Indian Ocean. With this and a naval ally to conduct joint operations, the Russian Navy stands to gain a great deal in regaining some of the grandiosity it had in its past. Much needed funding for the maintenance of its failing fleet drives the Russian Navy to advocate such a course of action.

As Russia regains its economic stability, it will be less likely to transfer its power resources to other countries for economic purposes. With economic stability, Russian foreign exportation of technology and sales of conventional arms and nuclear expertise may still occur, but the reasons will likely be based more on strategic and bureaucratic versus economic motives. Often these bureaucratic organizations will gain more power in stable

⁷² Wallander, "Russia's Interest in Trading with the 'Axis of Evil.'"

⁷³ Ibid.

democratic economies, but sometimes their influence on the state may wane when it comes to deciding certain courses of action. The state may not need to generate economic capital the sales and transfer of nuclear technology, but may very well determine that it is in its best interests to foster strategic capital particularly with countries like India.

THIS PAGE INTENTIONALLY LEFT BLANK

IV. RUSSIA'S ASSISTANCE TO IRAN

A. INTRODUCTION

The purpose of this chapter is to discuss the Russia's past support toward Iran's nuclear program. Included will be a description of Iran's advancements with its nuclear power program through 2004 and how Russia has provided assistance in the past and continues to provide assistance. This chapter also discusses the implications of Russian assistance towards Iran obtaining an indigenous nuclear weapons program. Finally, reasons for Russian assistance and sales are addressed.

B. IRAN'S NUCLEAR POWER PROGRAM

Iran's nuclear power program consists of numerous facilities throughout the country. These facilities vary in their purpose and, until 2004, none have resided under full International Atomic Energy Agency, the UN's nuclear watchdog, safeguards. Even with the recent declared cooperation by Iran to fulfill its obligations under the NPT, there is still resistance to fully cooperate with the IAEA. Russia does not have interests in every facility, but has sold Iran technology and expertise that has helped advance most of its nuclear facilities.⁷⁴

1. Arak

The Arak facility is a heavy water production plant located 150 miles south of Tehran, and as of mid-August 2002, this site was 85 percent complete. Heavy water production plants are not fully covered by comprehensive

⁷⁴ Center for Nonproliferations Studies: Nuclear Threat Initiative database, "Country Overviews: Iran: Nuclear Facilities," http://www.nti.org/e_research/profiles/3119_3120.html.

IAEA safeguard agreements, and only Iran's agreement to allow inspections can give the IAEA the legal authority to inspect it. The Arak facility also contains a 40 MW IR-40, construction of which was planned to start in 2004. The facility was reportedly almost complete in January 2004.⁷⁵

For the Arak heavy water plant to be of any utility to Iran, it would have to be paired with a plutonium production reactor that has not yet been located. Publicly reported intelligence in December 1998, revealed that Russian nuclear institutes were actively negotiating to sell Iran a 40-megawatt heavy-water research reactor and a uranium-conversion facility.⁷⁶

2. Bushehr

Even though the nuclear facility at Bushehr falls under full IAEA safeguards, Russia's provision of expertise and manufacturing assistance has helped Iran to develop its own nuclear technology infrastructure. In addition, facing economic pressures, some Russian entities have shown a willingness to provide assistance to other nuclear projects within Iran. For example, an institute within the Ministry of Atomic Energy (MinAtom) had agreed to deliver atomic vapor laser isotope separation equipment, a technology capable of producing weapons-grade uranium. This accusation was denied by the Russian government and subsequently the delivery never occurred.⁷⁷

⁷⁵ Center for Nonproliferations Studies: Nuclear Threat Initiative database, "Issue Brief: Iran and the IAEA: A Troubling Past with a Hopeful Future? A Hidden Program Revealed," http://www.nti.org/e_research/e3_35a.html.

⁷⁶ Ibid.

⁷⁷ Center for Nonproliferation Studies: Nuclear Threat Initiative database, "Russia: Nuclear Exports to Iran: Enrichment, Mining, and Milling," <http://www.nti.org/db/nisprofs/russia/exports/rusiran/enrich.htm>.

At the Bushehr facility there is a 1000 MW nuclear power reactor that was due to become operational in the second half of 2004. This site was proposed to initially be operated by a joint Russian-Iranian crew. In 1995, Russia and Iran signed an \$800 million contract under which the former would provide the latter with a light water reactor at the Bushehr site. In early June 2003, Russian Atomic Energy Minister Alexander Rumyantsev was reported to have said the Bushehr reactor was set to open in 2005.⁷⁸ Then, on October 13, 2003, a Russian official said there would be a delay of one year in the completion of the Bushehr nuclear power reactor. "Right now our specialists are drawing up a detailed plan for the plant and the start-up is set for 2005" as opposed to 2004, Nikolai Shingaryev, a senior spokesman for the atomic energy ministry, told AFP by telephone. "The reasons are purely technical, not political."⁷⁹

Part of the negotiating process between Russia and Iran has been to determine the status of Iran's nuclear fuel cycle. On February 13, 2004, a Russian Energy Ministry official said that Iran and Russia might sign the protocol on exporting Russian nuclear fuel to Iran's Bushehr Nuclear Plant and return of the used fuel to Russia within the next two weeks.⁸⁰ In May 2004, Alexander Rumyantsev stated that the deal to return spent nuclear fuel to Russia was to be signed sometime in the summer of

⁷⁸ Center for Nonproliferations Studies: Nuclear Threat Initiative database, "Country Overviews: Iran: Nuclear Facilities: Bushehr-1," http://www.nti.org/e_research/profiles/Iran/Nuclear/3119_3186.html.

⁷⁹ Center for Nonproliferations Studies: Nuclear Threat Initiative database, "Country Overviews: Iran: Nuclear Facilities: Bushehr-1."

⁸⁰ Victor Mizin, "The Russia-Iran Nuclear Connection and U.S. Policy Options," *Middle East Review of International Affairs*, (March 2004).

2004.⁸¹ Additionally, the Ministry of Atomic Energy would jump at the chance to build additional reactors in Iran, to include three more at Bushehr and two at Ahwaz.⁸²

3. Tehran

The facility at Tehran has a research reactor (Tehran Research Reactor - TRR), a production facility that deals with the molybdenum, iodine, and xenon radioisotopes (MIX Facility) and a multipurpose laboratory (Jabr Ibn Hayan - JHL). The JHL was previously undeclared but the IAEA discovered there are stores of UF₆ (1000 kg), UF₄ (400 kg) and UO₂ (400 kg).⁸³ Iran also informed the IAEA in a letter on February 26, 2003, that most of the UF₄ was converted to uranium metal in 2000 at JHL.⁸⁴

At the Ibn-e Heysam Laser Technology Center, a subsidiary organization of Tehran Nuclear Research Center (TNRC), uranium laser enrichment is studied. The Russian Ministry of Atomic Energy (MinAtom) contracted to provide equipment to Iran that was clearly intended for Atomic Vapor Laser Isotope Separation (AVLIS). AVLIS technology could provide Iran the means to produce weapons quantities of highly enriched uranium. As a result of U.S. protests, the Russian Government halted the delivery of some of this equipment to Iran.⁸⁵

⁸¹ Maria Golovkina, "Report: Russia, Iran to Sign Nuke Deal Soon," *Washington Post* (May 25, 2004).

⁸² Angela Charlton, "Russia Expands Nuke Ties With Iran," Associated Press, July 26, 2002.

⁸³ Center for Nonproliferations Studies: Nuclear Threat Initiative database, "Country Overviews: Iran: Nuclear Facilities: Jabr Ibn Hayan Multipurpose Laboratories (JHL)," http://www.nti.org/e_research/profiles/Iran/Nuclear/3119_3166.html.

⁸⁴ International Atomic Energy Agency, "Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran" (June 6, 2003).

⁸⁵ Andrew Koch and Jeanette Wolf, "Iran's Nuclear Facilities: A Profile." Center for Nonproliferation Studies, 1998.

4. Training

The specific amount of training provided to Iran by Russia is unclear; however, it is logical that some operational training would be required for the Iranian section of the crew for Bushehr. According to *The Guardian* in 2003, Russia had trained up to 200 Iranian scientists at the Obninsk Atomic Energy University. Officials from the university claim that only basic knowledge and skills in the operation of the Bushehr plant were taught.⁸⁶ A month later ITAR-TASS reported a similar finding of 500 specialists trained by Russia in the operation of the Bushehr plant with possibly another 200 yet to receive training.⁸⁷

C. CONCLUSIONS

Every indication is that Russia assists Iran's nuclear power program. Russia does not deny this and there is no proof that it has violated any international standards. What are the global implications of Russian assistance to an Iranian nuclear weapons program? Those implications are subtle, but they include the advancement of nuclear technology, the training of Iranian technicians (increasing the indigenous expertise of Iran), and the increased materiel condition of Iran's nuclear program.

Iran has accepted IAEA safeguards including the additional protocol (December 2003), which allows inspections at shorter notice and includes inspections at

⁸⁶ Nick P. Walsh, "Russian Lessons," *The Guardian* (June 16, 2003), <http://www.guardian.co.uk/international/story/0,3604,978077.00.html>.

⁸⁷ Center for Nonproliferation Studies: Nuclear Threat Initiative database, "Russia: Nuclear Exports to Iran: Developments," <http://www.nti.org/db/nisprofs/russia/exports/rusiran/nukedev.htm#7102003>.

sites that are indigenous. However, Iran once 'postponed' IAEA inspections because of the 'Iranian New Year' in March 2004, and continues to stonewall the IAEA.⁸⁸

There are obvious economic gains for Russia involved with selling technology to Iran. Those gains include sales worth 800 million US dollars for the Bushehr reactor, capital from fuel sales and for the handling of the spent fuel. However, a Stanford economist's study indicates that any gains from returned spent nuclear fuel will only be able to fund safe storage of the imported materials and existing Russian materials.⁸⁹ If this study is correct, the Atomic Energy Agency may be under pressure to cut corners in order to provide the pay-offs promised regional politicians in exchange for political support of this plan and other nuclear policies.

A strategic foothold in the Middle East would provide Russia with influence on the international scene and with the United States. However, some of Russia's actions may be contradictory to its strategic and economic concerns. If Russia assists Iran with certain types of material and technology (specifically centrifuges and laser technology - uranium enrichment technology), Iran's ability to produce an indigenous program becomes that much more of a possibility. If Iran has an indigenous program, it will no longer need Russia for assistance, and may preclude Russia from making any economic gain from Iran. However, if bureaucratic actors use short term economic gain as a model

⁸⁸ Kenneth C. Brill, "Statement on the Implementation of Safeguards in the Islamic Republic of Iran," March 13, 2004.
<http://www.iaea.org/NewsCenter/Statements/Misc/2004/brill113032004.html>

⁸⁹ Chuen, "Russian Nuclear Exports to Iran: U.S. Policy Change Needed."

and forgo the prospect for lost revenues, then this could explain the current assistance. Indications also lead one to believe that the 'Russian state' does not want Iran to have a nuclear weapons program.⁹⁰ If Russia allows Iran to achieve an indigenous fuel cycle, an indigenous machining process, etc., then the next step to weaponization is actually the easy part of the equation.⁹¹

⁹⁰ Vladimir A. Orlov, "Iran's Nuclear Program Implications for the Dialogue Among Russia, the United States, and Europe," PONARS Policy Memo 358 (November 2004), 2.

⁹¹ Sokolski, *Best of Intentions: America's Campaign Against Strategic Weapons Proliferation*, 6-7.

THIS PAGE INTENTIONALLY LEFT BLANK

V. CONCLUSIONS

A. REASONS FOR RUSSIAN ASSISTANCE

Russia's economic decline is one reason it exports dual-use nuclear technology. It is hard for Russia to maintain disarmament goals set by existing non-proliferation treaties and programs because of its economic decline.⁹² It is also difficult for Russia to continue to provide jobs or a steady income to the over 120,000 experts, technicians, and workers who are employed in Russia's nuclear program.⁹³ Without the proper pay and other incentives, the threat of nuclear information and technology sales and even defection to non-nuclear states by these private actors increases. Similarly, due to the declining standard of living for nuclear technicians it is just as challenging to recruit new engineers to help maintain technological advances in the future, to include safety lockouts and safe handling procedures.

Bureaucratic politics is another factor that has led Russia to export nuclear technology. The Ministry of Atomic Energy (MinAtom), in an attempt to maintain its status and improve its funding priority in the future, often sought to maintain foreign export capability, within the confines of the Non-Proliferation Treaty in order to obtain capital from foreign countries by selling dual-use nuclear technology. MinAtom and the FAEA use this capital to maintain the nuclear industry within Russia. Additional ways the Russian government often uses this capital is to

⁹² Chuen, "Russian Nuclear Exports to Iran: U.S. Policy Change Needed."

⁹³ Joseph Cirincione, et al., *Deadly Arsenals: Tracking Proliferation of Weapons of Mass Destruction* (Washington, D.C., 2002), 119.

fund further nuclear research and to complete weapons projects⁹⁴, such as the construction of a fourth generation nuclear submarine in the Sevorodvinsk class.⁹⁵

Does Iran have any other incentives to offer other than capital to secure Russia's assistance in its nuclear power program? Russia's Navy has been in serious disrepair in the post-Soviet era due to economic strain. Approximately 70 percent of its ships desperately need repairs, only one third of its aircraft are flight ready, the number of personnel is 50 percent of what it was in the Soviet era, and fleet strength has been reduced by 60 percent. In 1998 85-90 percent of the Navy's budget went directly to personnel, however, Russia's Naval Chief of Staff, Admiral Kuroyedov, estimates that the fleet needs closer to 60 percent of the budget for maintenance to prevent it from 'rotting away'.⁹⁶ According to these statistics, Russia certainly needs help in the economic arena to maintain its Navy.

1. Russian Economic Decline

Russia's transition to a market economy has not been an easy one. Although in more recent years the economic outlook has been much more optimistic, throughout the 1990s Russia found it difficult to ensure its citizens were fed and taken care of. The priority for funding in the military sector decreased significantly due to this. Russia ranks number one in total land area, number six in

⁹⁴ Wallander, "Russia's Interest in Trading with the 'Axis of Evil.'"

⁹⁵ Vladimir Radyuhin, "India to lease Russian nuclear submarines," The Hindu (January 28, 2002), <http://www.hinduonnet.com/thehindu/2002/01/28/stories/2002012801431000.htm>.

⁹⁶ Charles Krupnick, *Decommissioned Russian Nuclear Submarines and International Cooperation* (Jefferson, 2001), 55-6.

total population, and yet only sixteenth in Gross Domestic Product (GDP). This places them at 100th in Gross National Income (GNI) per capita.⁹⁷ The trouble Russia has encountered with its economy has led to its serious decline as a world power; however, its advanced military research and development program provides a unique form of leverage on the global economic market. Its advancement in military equipment provides Russia with the ability to maintain trade with other countries. By selling military equipment, Russia is able to use its military infrastructure as an economic advantage towards maintaining its status as a superpower.

By using the state level of analysis to determine why Russia is willing to transfer its nuclear power assets and military equipment to other countries, specifically in the case of naval nuclear reactors; one may be able to see the economic advantage Russia achieves by cooperating in the nuclear arena with India. Even though Russia may be perceived to be breaking a global norm by assisting India in its nuclear submarine program, it may be able to justify its actions by way of economic benefit and a semblance of maintaining existing contracts: Russia is not breaking any non-proliferation treaty regulations (contract) by assisting India (India is already a nuclear nation) Russia has long been a strategic partner with India, and lastly by further cooperating with India, Russia may secure future trade (economic benefit) and cooperation from a possible superpower of the twenty-first century. These reasons may not correlate to classic realism; however, they may give Russia the ability to preserve its national security in the

⁹⁷ World Bank Group Website, "Russian Economic Report Number 8," http://ns.worldbank.org.ru/files/rer/RER_8_eng.pdf.

short term by maintaining a strategic alliance with a powerful ally until it is able to recover from the economic losses it has suffered throughout the last two decades. At the same time, by forging a strong relationship with India, Russia may be able to accelerate its economic recovery through trade and cooperation.

2. Defection of Experts

On an individual level of analysis, the amount of workers currently employed in Russia's nuclear industry may base their decisions on the likelihood of receiving their next paycheck. If nuclear experts determine that Russia is unable to meet their standard of living requirements or desires, they may make a conscious decision to sell their knowledge to India or other countries. Although no sources have indicated this is the case in the India-Russia ATV study, the possibility continues to exist for individual defection or assistance in nuclear matters for compensation. To prevent individual defection and individuals personally selling knowledge, or brain drain, Russia might enter into a contractual agreement with India, Iran or other countries in order to maintain some control over what information passes across Russian borders. In turn foreign nations might not attempt to lure Russian individuals with monetary enticement if Russia is cooperating with them on the state level. This contractual agreement benefits all parties. It benefits the foreign nation, since it receives technological help on a problem it has been unable to solve indigenously. The agreement would also benefit Russia through capital gain for its assistance and government control in the levels of information that it lends to other countries.

Russia's staggering economy has given it little choice but to bargain and seek contracts with countries such as India and Iran.⁹⁸ These contracts have been in the form of military aid and support in India's nuclear submarine and other nuclear programs and Iran's nuclear energy program throughout the years. These contracts have been necessary to infuse capital into Russia's industrial sector and to secure jobs and income for many of Russia's workers, to include experts in the nuclear sector.

3. Bureaucratic Politics

Bureaucratic infighting is a problem in Russia as much as it is in the United States, if not more so. Whether or not Russia has a poor economy, the levels of bureaucracy will still be competing for their program funding priority. The Atomic Energy Agency is responsible for the 'development, production, and conversion of both nuclear explosive charges and corresponding ammunition, as well as in the sphere of nuclear engineering'.⁹⁹ If the FAEA feels that it is unable fulfill its duties due to insufficient funding, it may be compelled as an organization to lobby the Russian government to cooperate with other countries in nuclear matters. By achieving this goal of multi-national cooperation, the FAEA increases its importance as a federal organization and therefore increasing its program funding priority.¹⁰⁰ The FAEA is also responsible for ensuring the requirements of all international agreements on the transfer of nuclear materials and technology are fulfilled,

⁹⁸ Wallander, "Russia's Interest in Trading with the 'Axis of Evil.'"

⁹⁹ "Mission of the Ministry of Russian Federation on nuclear energy," <http://www.minatom.ru/english/about/mission.html>.

¹⁰⁰ Wallander, "Russia's Interest in Trading with the 'Axis of Evil.'"

but this organization and its predecessors have been able to find loopholes in these agreements in the past.

The Cooperative Threat Reduction (CTR) program is an instance where Russia has entered into a contractual agreement with the United States to assist it in the elimination of its nuclear weapons. Without the aid and financial support of the US, Russia would be unable to meet current nuclear weapons reduction goals. Much of the financial support of the CTR program goes towards retraining weapon scientists in the former Soviet Union. This contract and the financial support that comes with it helps maintain MinAtom's funding priority, as it is the agency that is responsible for the deactivation and reduction of Russia's nuclear weapons.¹⁰¹

a. *Naval Cooperation*

Another government organization that stands to gain importance with the transfer of naval nuclear technology to India is the Russian Navy. As discussed previously, the Russian Navy has fallen into serious disrepair in the post-Cold War era. Just as with Russia's Atomic Energy Agency and every other bureaucratic organization, the Russian Navy must compete for funding from the Russian government. The more the navy sells its importance in maintaining Russia's superpower status, the more likely it is to secure future funding for not only maintenance, but also research and development of new technology, ships, submarines, and aircraft. If and when India purchases or leases Russian nuclear submarines, the Russian Navy will gain not only required funding, but it

¹⁰¹ Center for Nonproliferation Studies: Nuclear Threat Initiative Database, "The Nunn-Lugar Cooperative Threat Reduction (CTR) Program," http://www.nti.org/db/nisprofs/russia/forasst/nunn_lug/overview.htm.

will also serve to increase its importance in the structure of the Russian government. The additional funding acquired in any deals with India will help to maintain its nuclear and conventional fleet.

The FAEA and the Russian Navy are both organizations of groups of individuals and therefore fall into the individual level of analysis. The perceptions and priorities of these organizations matter when they determine their individual courses of action. Sometimes these courses of actions may include decisions that are contrary to realists perceptions of the way states act to maintain its survival. By making decisions that increase their importance in the scope of Russia's governmental organizations, they in effect secure their own survival. At the state level of analysis, the Russian government may yield to organizational lobbying in order to secure support from individuals and organizations for its survival as a government. This is another possible reason that Russia may attempt to enter into contracts that include transferring its nuclear power resources to India and other countries.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

- Alimov, Rashid and Igor Kudrik. "Adamov sacked for unprofitable proliferation" (March 29, 2001). <http://www.bellona.no/en/international/russia/waste-mngment/20030.html> Accessed June 26, 2007.
- Aven, Peter. "Russian Economic Growth: Glass Half Empty or Half Full?" (April 29, 2004), *Alfa Bank Bulletin*. <http://www.alfabank.com/media/clippings/2004/04/29/> Accessed June 26, 2007.
- Ball, Deborah Yarsike and Theodore P. Gerber. "Will Russian Scientists go Rogue? A Survey on the Threat and the Impace of Western Assistance," PONARS Policy Memo 357 (November 2004).
- Behdi, Rahul. "Agni II Now in Production," *Jane's Missiles and Rockets*. Vol. 5, No. 8, August 1, 2001; in Lexis-Nexis Academic Universe. <http://web.lexis-nexis.com>. Accessed 26 June, 2007.
- . "Russians Help India to Solve SSN Snags," *Jane's Defence Weekly* (May 19, 2004). <http://jdw.janes.com>. Accessed 26 June, 2007.
- Bransten, Jeremy. "Russia Joins U.S. Led-Initiative on WMD," Radio Free Europe/Radio Liberty (June 2, 2004). <http://www.rferl.org/featuresarticle/2004/6/BCE976F8-687C-4B2B-B1EF-F94ACB605969.html> Accessed June 26, 2007.
- Brill, Kenneth C. "Statement on the Implementation of Safeguards in the Islamic Republic of Iran." March 13, 2004. <http://www.iaea.org/NewsCenter/Statements/Misc/2004/brill13032004.html> Accessed June 26, 2007.
- Brown, Archie. *Contemporary Russian Politics: A Reader* (Oxford, 2001).

Center for Nonproliferations Studies: Nuclear Threat Initiative database, "Country Overviews: Iran: Nuclear Facilities."

http://www.nti.org/e_research/profiles/3119_3120.html

Accessed June 26, 2007.

—: Nuclear Threat Initiative database, "Country Overviews: Iran: Nuclear Facilities: Bushehr-1."

http://www.nti.org/e_research/profiles/Iran/Nuclear/3119_3186.html

Accessed June 26, 2007.

—: Nuclear Threat Initiative database, "Country Overviews: Iran: Nuclear Facilities: Jabr Ibn Hayan Multipurpose Laboratories (JHL)."

http://www.nti.org/e_research/profiles/Iran/Nuclear/3119_3166.html

Accessed June 26, 2007.

—: Nuclear Threat Initiative database, "Issue Brief: Iran and the IAEA: A Troubling Past with a Hopeful Future? A Hidden Program Revealed."

http://www.nti.org/e_research/e3_35a.html Accessed June 26, 2007.

—: Nuclear Threat Initiative Database, "The Nunn-Lugar Cooperative Threat Reduction (CTR) Program."

http://www.nti.org/db/nisprofs/russia/forasst/nunn_lug/overview.htm

Accessed June 26, 2007.

—: Nuclear Threat Initiative database, "Russia: Nuclear Exports to India: Developments."

<http://www.nti.org/db/nisprofs/russia/exports/rusind/nuke/dev.htm>

Accessed June 26, 2007.

—: Nuclear Threat Initiative database. "Russia: Nuclear Exports to India: Reactors."

<http://www.nti.org/db/nisprofs/russia/exports/rusind/react.htm>

Accessed June 26, 2007.

—: Nuclear Threat Initiative database. "Russia: Nuclear Exports to Iran: Developments."

<http://www.nti.org/db/nisprofs/russia/exports/rusiran/nukedevel.htm#7102003>

Accessed June 26, 2007.

—: Nuclear Threat Initiative database. "Russia: Nuclear Exports to Iran: Enrichment, Mining, and Milling." <http://www.nti.org/db/nisprofs/russia/exports/rusiran/enrich.htm> Accessed June 26, 2007.

Cerniello, Craig. "Yeltsin Government Shake-Up Unlikely to Affect Arms Control," *Arms Control Today* (March 1998), http://www.armscontrol.org/act/1998_03/shakeup.asp Accessed June 26, 2007.

Charlton, Angela. "Russia Expands Nuke Ties With Iran," Associated Press. July 26, 2002.

Chuen, Cristina. "Russian Nuclear Exports to Iran: U.S. Policy Change Needed." *Center for Nonproliferation Studies*. <http://cns.miis.edu/pubs/week/030327.htm> Accessed June 26, 2007.

Cirincione, Joseph, et al. *Deadly Arsenals: Tracking Proliferation of Weapons of Mass Destruction* (Washington, D.C., 2002).

"Delhi to lease Russian SSNs," *Jane's Defence Weekly* (February 6, 2002), <http://jdw.janes.com>. Accessed June 26, 2007.

The Economist. "Slaying his own dragons" (May 1, 2004).

FBIS Media Analysis. "Russia — Press Views Retention of Heavy Missiles as Answer to US NMD, Defeat for Kvashnin Reform." August 30, 2002.

Federation of American Scientists. "Ministry of Atomic Energy (Minatom)." <http://www.fas.org/nuke/guide/russia/agency/minatom.htm> Accessed June 26, 2007.

- Gangadharan, Surya. "Nuclear Reactor for ATV Ready," *Strategic Affairs Magazine*, (December 16, 2001).
<http://www.stratmag.com/issue2Dec-15/page02.htm> Accessed June 26, 2007.
- Golovnina, Maria. "Report: Russia, Iran to Sign Nuke Deal Soon," *Washington Post* (May 25, 2004).
- "Icing on Gorshkov cake for India: a nuclear submarine," *Bharat Varsha 1947: The Voice of the Free Indian*.
http://www.geocities.com/bharatvarshal947/december15_2002/nuclearsub.htm Accessed June 1, 2004.
- "Indian Nuclear Submarine Fleet Development Program: Russian Participation."
<http://www.nyu.edu/globalbeat/southasia/PIR031599.html>
 Accessed June 26, 2007.
- Interfax, May 28, 2002; in "Russia to train around 100 Iranian engineers to operate Bushehr-1 nuclear plant." FBIS Document CEP20020528000137.
- International Atomic Energy Agency. "Statute of the IAEA" (Vienna, 2003).
<http://www.iaea.or.at/About/history.html> Accessed June 26, 2007.
- . "Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran" (June 6, 2003).
- Joshi, Manoj. "Nuclear Wishlist Is Heart of Carrier Deal," *The Times of India* (January 21, 2004).
<http://timesofindia.indiatimes.com/articleshow/435662.cms>
 Accessed June 1, 2004.
- Khripunov, Igor. "Russia's Nukes: MinAtom at the Edge," *Bulletin of the Atomic Scientists* (May/June 1999, Vol. 55, No. 3).

Koch, Andrew and Jeanette Wolf, "Iran's Nuclear Facilities: A Profile." Center for Nonproliferation Studies, 1998.

Kononov, L. A. "RF, World Nuclear Security, Need for Changed Nuclear Policy in the Modern World." *FBIS*, December 14, 2000.

Krupnick, Charles. *Decommissioned Russian Nuclear Submarines and International Cooperation* (Jefferson, 2001).

"Mission of the Ministry of Russian Federation on nuclear Energy."
<http://www.minatom.ru/english/about/mission.html> Accessed April 15, 2004.

Mizin, Victor, "The Russia-Iran Nuclear Connection and U.S. Policy Options," *Middle East Review of International Affairs* (March 2004).
<http://meria.idc.ac.il/journal/2004/issue1/jv8n1a7.html>
Accessed June 26, 2007.

Nilsen, Thomas and Vlad Nikiforov. "Adamov fired" (March 28, 2001).
<http://www.bellona.no/en/international/russia/waste-mngment/20006.html> Accessed June 26, 2007.

Orlov, Vladimir A. "Iran's Nuclear Program Implications for the Dialogue Among Russia, the United States, and Europe," PONARS Policy Memo 358 (November, 2004), 2.

PIR-Center for Policy Studies in Russia, "Indian Nuclear Submarine Fleet Development Program: Russian Participation" (March 15, 1999).
<http://www.nyu.edu/globalbeat/southasia/PIR031599.html>
Accessed June 26, 2007.

Pravda.RU. "President Putin dismisses Cabinet" (February 24, 2004).

<http://newsfromrussia.com/main/2004/02/24/52476.html>

Accessed June 26, 2007.

Putin, Vladimir. "Address to the Federal Assembly of the Russian Federation" (May 26, 2004).

<http://www.cdi.org/russia/johnson/2004-state-nation.cfm>

Accessed June 15, 2004..

Radyukhin, Vladimir. "India to lease Russian nuclear Submarines." *The Hindu* (January 28, 2002).

<http://www.hinduonnet.com/thehindu/2002/01/28/stories/2002012801431000.htm>

Accessed June 26, 2007.

Ramana, M.V. "An Estimate of India's Uranium Enrichment Capability," *Science and Global Security* (December 2004).

http://www.princeton.edu/~globsec/publications/pdf/12_1-2_ramana.pdf

Accessed June 26, 2007.

"Russia helps India build nuclear submarine," *Bellona Foundation* website.

<http://www.bellona.org/e/russia/nfl/news/980917-2.htm>

Accessed April 15, 2004.

"Russia: Nuclear Exports to India: Training and Know-How," NTI website.

<http://www.nti.org/db/nisprofs/russia/exports/rusind/nuknow.htm>

Accessed June 26, 2007.

"Russian Election Boycott: Treading a Fine Line," *Radio Free Europe/Radio Liberty* (January 8, 2004, Vol. 5, No. 1),

<http://www.rferl.org/reports/ucs/2004/01/1-080104.asp>

Accessed June 26, 2007.

"Russian Government Restructuring and the Future of WMD Threat Reduction Cooperation," *RANSAC Policy Update* (May 21, 2004).

<http://www.ransac.org/Documents/rfgovtreorgupdate05212004.pdf>

Accessed June 26, 2007.

Shevtsova, Lilia. *Putin's Russia*. (Washington, D.C., 2003).

Sokoloski, Henry. *Best of Intentions: America's Campaign Against Strategic Weapons Proliferation* (Westport, 2001).

"Treaty on the Non-Proliferation of Nuclear Weapons"
(March 5, 1970).
<http://www.fas.org/nuke/control/npt/text/npt2.htm>
Accessed June 26, 2007.

United Nations Security Council. "Resolution 1540 (2004)"
(April 28, 2004).
<http://daccessdds.un.org/doc/UNDOC/GEN/N04/328/43/PDF/N0432843.pdf?OpenElement> Accessed June 1, 2004.

U.S. Congress, Office of Technology Assessment.
Technologies Underlying Weapons of Mass Destruction, OTA-BP-ISC-115 (Washington, D.C.: U.S. Government Printing Office, December 1993).
<http://www.wws.princeton.edu/cgi-bin/byteserv.prl/~ota/disk1/1993/9344/9344.PDF> Accessed June 26, 2007.

U.S. Department of State Bureau of Public Affairs.
"Proliferation Security Initiative" (Washington, DC, September 15, 2003).
<http://www.state.gov/r/pa/ei/rls/24134.htm> Accessed June 26, 2007.

U.S. Department of State Fact Sheet. "Proliferation Security Initiative: Statement of Interdiction Principles" (Washington D.C., September 4, 2003).
<http://www.state.gov/t/np/rls/fs/23764.htm> Accessed March 25, 2004.

Viner, Jacob. "Power Versus Plenty as Objectives of Foreign Policy in the Seventeenth and Eighteenth Centuries," *World Politics* (Vol. 1, No. 1, October 1948).

Wallander, Celeste. "Russia's Interest in Trading with the 'Axis of Evil,'" Testimony for "Russia's Policies Toward the Axis of Evil: Money and Geopolitics in Iraq and Iran." Hearing before the House Committee on International Relations. February 26 2003.

Walsh, Nick P. "Russian Lessons," The Guardian (June 16, 2003).
<http://www.guardian.co.uk/international/story/0,3604,978077.00.html> Accessed June 1, 2004.

Winner, Andrew C. "The Proliferations Security Initiative: The New Face of Interdiction." *The Washington Quarterly* (Spring 2005).

World Bank Group Website, "Russian Economic Report Number 8." http://ns.worldbank.org.ru/files/rer/RER_8_eng.pdf
Accessed June 26, 2007.

World Investment News. "Interview with Mr. Alexander Yu. Rumyantsev" (April 29, 2002).
<http://www.winne.com/topinterviews/yu.htm> Accessed June 26, 2007.

Yahoo! India News. "Deal Done, Gorshkov Awaits New Garb and Master" (January 21, 2004).
<http://in.news.yahoo.com/040120/58/2b12d.html> Accessed June 26, 2007.

Yemelyanenko, Aleksandr. "Former Russian Atomic Energy Minister Interviewed on Sector's Reduced Status." *FBIS*. March 23, 2004.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
Ft. Belvoir, Virginia
2. Dudley Knox Library
Naval Postgraduate School
Monterey, California
3. Professor Peter Lavoy
Naval Postgraduate School
Monterey, California
4. Professor Anne L. Clunan
Naval Postgraduate School
Monterey, California